AN 2002:169905 CAPLUS <<LOGINID::20081025>>
DN 136:235624
TI Target material for wiring film formation by sputtering and the film
IN Oda, Nobuhiro; Ueno, Takashi
PA Furuya Metal Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 4 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2002069550	A	20020308	JP 2000-267822	20000904
PRAI JP 2000-267822		20000904		

AB An alloy for the title target material is comprised of ≥3 elements: base metal Cu (85-99.7%), Ag, and other selected elements. The selected elements are Pd, Al, Au, Pt, Ta, Cr, Ni, Co, Si, and/or Zr. The addition of the selected elements improves corrosion resistance, optical properties, and elec. conductivity of the target material.

FULL CONTENTS

[Claim(s)]

[Claim 1] The metallic material of at least three or more elements which contains Cu 99.7 to 85.0weight % by making Cu (copper) into a principal component, adds Ag (silver) to it and comes to contain the alloying element aiming at corrosion-resistant improvement further.

[Claim 2] Add Ag (silver) to it by making Cu (copper) into a principal component, and further corrosion-resistant improvement as a target alloying element The singular number from Pd (palladium), aluminum (aluminium), Au (gold), Pt (platinum), Ta (tantalum), Cr (chromium), nickel (nickel), Co (Cobalt), Si (silicon), and Zr (zirconium), or the metallic material according to claim 1 disclosed two or more election.

[Claim 3] The metallic material of at least three or more elements which adds Ag (silver) to it by making Cu (copper) into a principal component, and comes to contain the alloying element aiming at optical characteristics further.

[Claim 4] Add Ag (silver) to it by making Cu (copper) into a principal component, and further optical characteristics as a target alloying element The singular number from Pd (palladium), aluminum (aluminium), Au (gold), Pt (platinum), Ta (tantalum), Cr (chromium), nickel (nickel), Co (Cobalt), Si (silicon), and Zr (zirconium), or the metallic material according to claim 1 disclosed two or more election.

[Claim 5] The metallic material of at least three or more elements which adds Ag (silver) to it by making Cu (copper) into a principal component, and the alloying element aiming at an electrical property comes to contain further.

[Claim 6] Add Ag (silver) to it by making Cu (copper) into a principal component, and further an electrical property as a target alloying element The singular number from Pd (palladium), aluminum (aluminium), Au (gold), Pt (platinum), Ta (tantalum), Cr (chromium), nickel (nickel), Co (Cobalt), Si (silicon), and Zr (zirconium), or the metallic material according to claim 1 disclosed two or more election.

[Claim 7] The metallic material of at least three or more elements which adds Ag (silver) to it by making Cu (copper) into a principal component, and comes to contain the alloying element aiming at the manufacture ease of alloy material further.

[Claim 8] The Cu-Ag-Ti (copper-silver-titanium) alloy metallic material which adds Ag to it by making Cu into a principal component, and adds Ti (titanium) for the purpose of corrosion-resistant improvement further.
[Claim 9] The metallic material according to claim 1 to 8 characterized by Ag coming to contain 0.3 to 10.0weight %.
[Claim 10] The metallic material according to claim 1 to 8 characterized by Ag coming to contain 0.3 to 7.0weight %.
[Claim 11] The metallic material according to claim 1 to 8 characterized by Ag coming to contain 0.3 to 5.0weight %.
[Claim 12] The metallic material according to claim 1 to 11 characterized by Ti coming to contain 0.01 to 5.0weight %.
[Claim 13] The metallic material according to claim 1 to 11 with which Ti is characterized by 0.01-1, and coming to contain 5weight %.
[Claim 14] The metallic material according to claim 1 to 11 characterized by Ti coming to contain 0.03 to 0.9weight %.
[Claim 15] The metallic material according to claim 1 to 8 with which Ag is characterized by Ti coming to contain 0.03 to 0.9weight % 0.3 to 5.0weight %.
[Claim 16] The sputtering target material for thin film formation characterized by being formed using a metallic material according to claim 1 to 15.
[Claim 17] The thin film characterized by coming to be formed using a metallic material according to claim 1 to 15 or the sputtering target material for thin film formation according to claim 11.

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a metallic material, the sputtering target material for thin film formation, and a thin film.
[0002]
[Description of the Prior Art] In an electric device and electronic parts, the circuit pattern is conventionally formed as a wiring material using the metallic material by alloys, such as the metallic material by pure metals, such as Cu, aluminum, Mo, Ta, W, and Cr, aluminum-Cu, aluminum-Cu-Si, aluminum-Pd, Ta-Si, and W-Si.
[0003]
[Problem(s) to be Solved by the Invention] However, the above-mentioned metallic material has indefinite reliability in corrosion resistance. This invention is made paying attention to the problem which exists in such a Prior art, and aims at offering the alloy and the sputtering target for thin film formation which can form a thin film with high weatherability.
[0004] Furthermore, the stability in the sputtering process in the case of using it as the manufacture ease which is in charge of alloy production, and a sputtering target, It aims at offering the thin film which it comes to form using the sputtering target material for thin film formation and it which can aim at solution of various problems, such as simplicity.

[0005]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention uses as the sputtering target material for thin film formation the alloy which Ag and a corrosion-resistant improvement material come to contain, and, thereby, forms a thin film in Cu.

[0006] Moreover, this invention uses as the sputtering target material for thin film formation Ag and the alloy which one kind in Ti, Pd, aluminum, Au, Pt, Ta, Cr, nickel, Co, and Si or two or more kinds of elements come to contain as a corrosion-resistant improvement material, and, thereby, forms a thin film in Cu. [the alloy by this invention, the sputtering target for thin film formation, and a thin film] By adding Ag, Ti, or other corrosion-resistant improvement material to Cu, improvement in the high weatherability demanded in the air or special environment called chlorine, hydrogen, oxygen, and sulfur can be aimed at according to the weatherproof interaction of Ag, Ti, or other corrosion-resistant improvement material. Therefore, the junction nature of a thin film and a substrate is strengthened and higher reliability is acquired.

[0007]

[Embodiment of the Invention] When it was considered as an alloy, as a Cu alloy material concerning this invention, Ag was chosen because the high reflectance characteristics of Ag and the weatherability to oxygen or hydrogen were aimed at. Here, the contents of each metal of an alloy are the contents given in one of claims.

[0008] On the other hand, Ti is stable in the air, tolerant to the reaction of sulfur or chlorine, and excellent in the corrosion resistance especially over sea water. Therefore, the metallic material of this embodiment demonstrates the following effects.

[0009] Improvement in the high weatherability demanded in the air or special environment called chlorine, hydrogen, oxygen, and sulfur can be aimed at by adding one sort in a fixed quantity of Ag(s), and a fixed quantity of corrosion-resistant improvement material, for example, Ti and Pd, or two sorts to Cu.

[0010] Here, the manufacture method of a sputtering target material is explained. The scorification in the inside of a vacuum is mentioned as the production method of the sputtering target material of this embodiment.

[0011] In producing Cu alloy with scorification, it produces a Cu-X (X is Ti, Pd, etc.) hardener first. Next, in a high frequency fusion furnace, the dissolution of a Cu-X hardener, Cu, and Ag is performed. Let quantity of Cu at this time be the quantity which deducted the quantity of Cu in a hardener from the whole dissolved amount.

[0012] As for the melting temperature in this case, the crucible of C, Al2O3, MgO, and ZrO2 grade is used, for example as 1100-1800 degrees C, for example. After dissolving, teeming of the melt is carried out to the mold of C, Al2O3, MgO, and ZrO2 grade. In order to prevent a shrinkage cavity, mold heating is beforehand performed at 200-1200 degrees C.

[0013] The melt in a mold is cooled and solidified, an ingot is taken out from a mold, and it cools to ordinary temperature. Next, cutting removal of the riser part of the topmost part of an ingot is carried out, and an ingot is rolled with a rolling mill, for example, the tabular alloy of 90mm [(mm)] x 90(mm) x8.1 (mm) is produced.

[0014] Then, it heat-treats, after the electric furnace has enclosed Ar gas, for example, and it corrects by curving with a pressing machine further after that. Then, a wire cut can be carried out at a product configuration, the front of a product can be ground using waterproof abrasive paper, surface roughness can be adjusted, and, finally the sputtering target material of the Ag alloy of this invention can be produced.

[0015] As mentioned above, when adding the element X of Ag and others to Cu when producing the sputtering target material of Cu alloy of this embodiment, and fusing, the easy method currently performed conventionally can be applied, and Merritt is large also in process also in price.

[0016] In addition, the thin film by weld slag shows what is obtained by carrying out the weld slag of each element simultaneously at the time of membrane formation here, and the thin film by the alloy with which the thin film by an integral type is the stage of target manufacture, and each element was mixed is shown.

[0017] Next, the weatherproof test result which followed the thin film is explained. Here, the chlorine examination was done. A chlorine examination is ordinary temperature and was done by immersing this sample in the salt water of concentration 5% for 120 minutes for 60 minutes for 30 minutes.

[0018] Table 1 shows the chlorination test result carried out about the Cu-Ti-Ag alloy thin film.

[0019]

[Table 1]

材料組成 (Wt%)	条件	耐塩水結果		
		30min	60min	120min
Ag	一体型	白濁化	→	→
Cu (6N)	一体型	白濁化	→	→
Cu5.0Zr10.0Ag	一体型	白濁化	→	→
Cu5.0Zr5.0Ag	一体型	白濁化	→	→
Cu5.0Ti10.0Ag	一体型	変化無し	白濁化	→
Cu2.0Ti4.0Ag	コスパッタ	変化無し	白濁化	→
Cu1.0Ti2.0Ag	コスパッタ	変化無し	変化無し	変化無し
Cu0.6Ti0.9Ag	一体型	変化無し	変化無し	変化無し
Cu0.5Ti30.0Ag	コスパッタ	白濁化	→	→
Cu0.5Ti20.0Ag	コスパッタ	白濁化	→	→
Cu0.5Ti10.0Ag	コスパッタ	変化無し	白濁化	→
Cu0.5Ti5.0Ag	コスパッタ	変化無し	白濁化	→
Cu0.5Ti1.0Ag	コスパッタ	変化無し	変化無し	変化無し
Cu0.5Ti1.0Ag	一体型	変化無し	変化無し	変化無し
Cu0.2Ti0.9Ag	一体型	変化無し	変化無し	白濁化
Cu0.1Ti30.0Ag	コスパッタ	白濁化	→	→
Cu0.1Ti20.0Ag	コスパッタ	白濁化	→	→
Cu0.1Ti10.0Ag	コスパッタ	白濁化	→	→
Cu0.1Ti0.45Ag	コスパッタ	変化無し	変化無し	変化無し
Cu0.1Ti0.2Ag	コスパッタ	変化無し	変化無し	白濁化

When a thin film is formed using the sputtering target material for thin film formation of Cu alloy of this embodiment, about weatherability, weatherability is improved, and the junction nature of a substrate and a thin film is strengthened by the interaction of Ag and Ti, and the effect that higher reliability is acquired is demonstrated.

[0020] In addition, this invention can be materialized as follows in addition to said embodiment.

- Although the aforementioned embodiment explained using Ag and the Cu-Ti-Ag alloy thin film by which Ti was further added as the third element as a thin film by using Cu as a base material, the third element is not necessarily limited to Ti. For example, the singular number or the case where two or more election is disclosed is raised from Pd, aluminum, Au, Pt, Ta, Cr, nickel, Co, Si, and Zr.

[0021] - In the aforementioned embodiment, although an example of scorification was given about the manufacturing method of a target, a manufacturing method is not necessarily limited to this and also has methods, such as a sintering process.

[0022]

[Effect of the Invention] The metallic material and sputtering target material of this invention can secure high endurance to oxygen, sulfur, chlorine, etc.

[0023] The metallic material and sputtering target material of this invention can produce a product with the simple scorification used conventionally. The thin film formed using the metallic material or sputtering target material of this invention is excellent in respect of weatherability.

[Translation done.]